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THE
MODERN OPERATION FOR CATARACT.

A LECTURE

DELIVERED AT THE

HARVARD MEDICAL SCHOOL,

APRIL 5, 1871.

WITH AN ANALYSIS OF SIXTY-ONE OPERATIONS.

BY ✓

HASKET DERBY, M.D.

UNIVERSITY LECTURER ON OPHTHALMOLOGY, AND SURGEON TO THE MASSACHUSETTS
CHARITABLE EYE AND EAR INFIRMARY.

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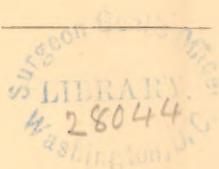
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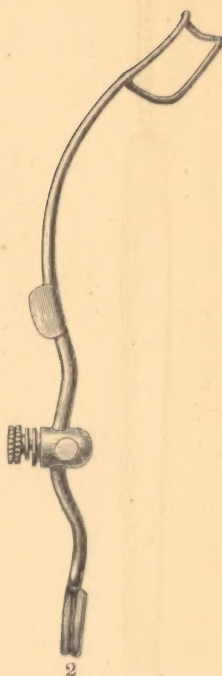
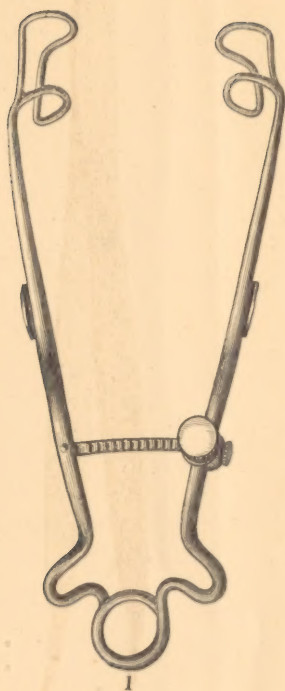
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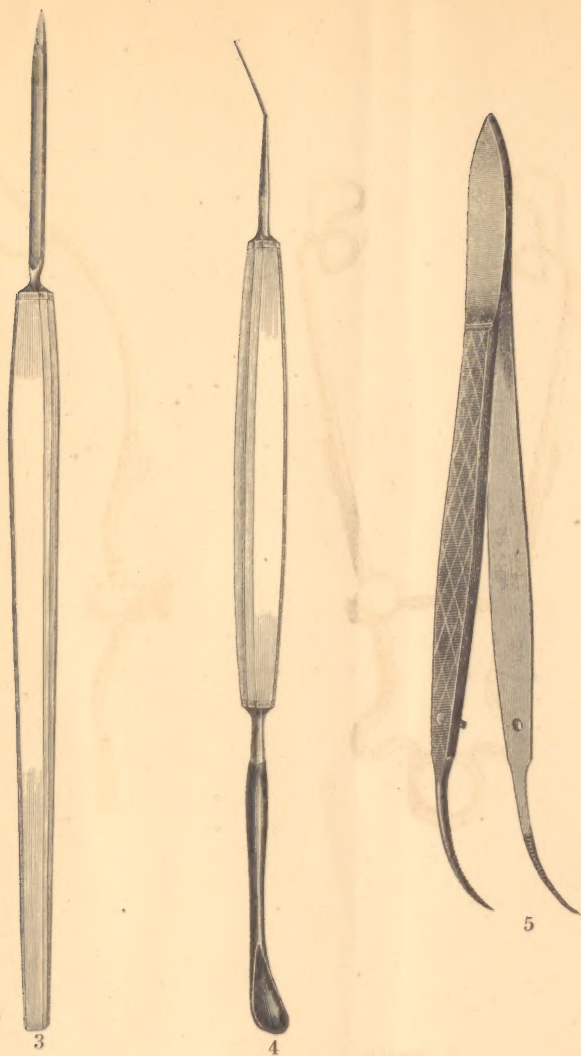
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1 Speculum.

2 Side view of Speculum, showing curve.



- 3 Knife. The line, 5 ^{mm} from its point, shows proper length of cut.
 4 Capsule opener and rubber spoon.
 5 Capsule forceps.

MODERN OPERATION FOR CATARACT.

WE detailed with some minuteness, at the last lecture, the method of flap extraction, and showed its superiority over all others that had gone before, for the removal of senile cataract. Its general introduction was, indeed, a great advance for the ophthalmic surgery of the day. The percentage of entire failure was reduced more than one half. Where two or three lost the eye after a needle operation, only one was thus unfortunate after an extraction. In round numbers nine people out of ten thus treated regained useful vision.

Improvement, however, was not to end here. Statistics showed that, in spite of the utmost skill, a certain number of flap extractions failed, ten people in a hundred not recovering sight. Clinical examinations of eyes recently operated on disclosed the fact that want of success was principally due to imperfect healing of the cornea, and inflammation of the iris. Moreover, the after-treatment was tedious and protracted, requiring the greatest watchfulness on the part of the surgeon and nurse, the greatest care and endurance on that of the patient. And thus the leaders of the science were led to cast about them for some other operation that might combine greater safety with an easier convalescence.

Three new methods of operating for cataract, therefore, appeared early in the past decade. The first was put forward by Dr. Mooren, in 1862, and consisted in the performance of an iridectomy, that is in the removal of a segment of the iris corresponding to the apex of the flap, two weeks before the extraction. This was submitted to an extensive trial, and

with marked success. It rendered the operation unquestionably safer. For, you will remember from the last lecture, the dangers of flap extraction lie in—1st, diffuse suppuration of the cornea; 2d, defined suppuration of the same; 3d, iritis. Against the first, iridectomy is powerless. But it modifies the course of the second, and protects in great measure against the third; affording thus, in the aggregate, an important diminution of danger. The great objection to it is that it subjects the patient to the anxiety and shock of two operations, instead of one.

To avoid this, Prof. Jacobson, of Königsberg, proposed, in 1863, the following plan of extraction, and introduced the very important principle, that a cut made in the sclero-corneal junction heals more readily than one carried out in the cornea itself. You are aware that the cornea is set into the sclerotic, not at the very edge of the anterior chamber, but a little within it, just as a watch crystal does not at its edge come square against the edge of the face, but is set into a metal rim that overlies it, rendering it, therefore, possible to pierce the sclera with a knife or needle this side of the rim of the cornea, and yet emerge in the anterior chamber. The part corresponding to the metal edge holding the crystal of the watch is called the sclero-corneal junction. It was in this region that Jacobson made his flap. Having narcotized his patient, he made a lower section, just below the horizontal meridian of the cornea, the line of which in no place invaded its substance. Having removed the lens in the usual manner, a broad iridectomy was made downwards, the object being to remove that portion of the iris most likely to have been bruised by the cataract in its exit, and most liable, therefore, to cause inflammation of the entire structure. The results of this operation, in the hands of its originator, were found wonderfully superior to those of ordinary flap-extraction, while the objections to it were the unfavorable effect on vision of a downward iridectomy, and the difficulties and dangers in the way of excising a piece of the iris after the removal of the lens.

Previous to the bringing forward of either of these methods, Schufl (now Waldau) of Berlin, had invented, and, in 1860, published an account of certain instruments for facilitating the linear extraction of cataract, a series of spoons, one of which, introduced through the incision and passed behind the lens, was to hold the nucleus, pressed forwards against the cornea, between its edges, and withdraw it by simple traction.

These instruments, however, turned out to be too large and clumsy for the purpose desired, their introduction doing appreciable violence to the eye. But, in 1865, Critchett and Bowman, the distinguished surgeons of Moorfields Hospital, London, devised scoops or spoons, far better than and preferable to those of Schufl; and, through the articles written and the cases treated by them, scoop extraction, or out-spooning, was raised to the dignity of a separate method. For some time it held its place as the favorite operation at Moorfields, and proved remarkably successful.

In doing the scoop operation, an incision is made upwards, with a broad lance knife, specially made for the purpose, at the sclero-corneal junction, from 4''' to 4½''' in length. A large piece of iris is removed. The capsule is next opened very freely. The scoop must then be introduced, so as to glide readily behind the posterior surface of the cataract, which, being grasped by the scoop, is to be slowly removed. This latter manœuvre requires great delicacy of manipulation. Especial care must be taken not to dislocate the lens in introducing the scoop, and not to press it so far forward as to injure the iris or cornea during its extraction.

"Thus," says Critchett, in his description of his method, "there suddenly appeared three new methods of operating for cataract, bearing the name of their several champions—Mooren, Jacobson and Schufl; but justice compels me to state that these gentlemen lighted their tapers at the torch of their great master, Prof. von Graefe. Each of these methods had been previously suggested and practised by him, but only in exceptional cases instead of as a general rule."

You will observe that each of these methods differs from

flap extraction in one very important respect, namely the removal of a portion of the iris, which in ordinary extraction is left untouched. It is against this "mutilation," as it is termed, that so much outcry has been raised by the opponents of the school of Graefe. And we readily agree with them that a whole iris is better than a part of one, and that an eye on which no iridectomy has been done is a handsomer eye to look at and a slightly better eye to see with than one on which this operation has been performed. On the other hand, we assert that where the iridectomy is done upwards, and the aperture left thus covered by the upper lid, the unsightliness disappears, and the optical disadvantage is so slight as to be practically not worth regarding. Furthermore, we positively claim that the removal of a portion of the iris leaves an easier passage for the lens, guards against present inflammation, modifies what may occur later, and gives the eye a better chance of recovery. Statistics prove beyond a peradventure that an eye is less likely to be lost after an extraction accompanied by iridectomy, than after one where it has been omitted; and that there are now more cases of cure than before the introduction of this modification.

An operation that should avoid the dangers of previous methods, while combining their advantages, was yet to be discovered; and it fell to the lot of Prof. von Graefe to render this distinguished service to science.

In 1865, the same year in which the articles of Critchett and Bowman on scoop-extraction appeared, he read to the Heidelberg Society, at its annual meeting in September, an account of a new procedure. He spoke of the advantages of the English method of scoop-extraction, and gave a detailed account of the 118 cases in which he himself had performed it, and the results attained; and then added that he had entirely abandoned this operation, in spite of the favorable opinion he had at one time formed of it. Reviewing his former studies on the subject of the linear cut, he had hit upon a method which allowed the cut to be executed in a better manner, and gave increased facilities for the removal

of the lens. He modestly added, that, having as yet performed it only 69 times, he would only call the attention of those present to it, and ask them to give it their consideration, not presuming as yet to maintain its superiority over other methods, or in all cases.

These 69 operations were performed by Graefe during the last ten days of May and the months of June and July. The heat of the season was unusually intense and long-continued, and all except 8 of these patients were in the public wards of the hospital. Had the proportion of private patients been larger, the results would undoubtedly have been more brilliant. As it was, there were 62 entire and seven partial successes, not a single eye being entirely lost.

A year later, he reported 300 cases of the operation, many of them being of a kind in which flap extraction would have had either to be preceded by a preparatory operation, or would have been refused altogether. Unripe cataracts, commencing cataracts, simple central opacities of the posterior polar region, lamellar cataracts, cases of granular lids, disease of the lachrymal passage, and even chronic iritis were among them. One man was operated on who was liable to cramp of the facial nerve, so aggravated by touching the eyelid that no preliminary examination of the cataract could be made. One of his eyes was lost, the other saved. Another patient had senile atrophy of the brain, causing raging delirium the day after the operation, and yet regained both eyes. In short, complete success was attained in 94 per cent. of all the cases, completely outstripping the results of flap extraction, and, in view of the unfavorable circumstances that have been detailed, remarkable in the extreme.

In view of all this, as well as of the relatively short duration of the after-treatment, and the comparative freedom enjoyed by the patient during its continuance, Graefe now proposed that his method should no longer be a supplement to, but rather a substitute for flap extraction; in other words, that it should become *the* operation for senile cataract.

Prof. Knapp, formerly of Heidelberg, but now of New York,

published, in 1867, a statement of one hundred cases operated on by the new method. Of these cases—

2 resulted in loss of vision;
in 13 partial, and
in 85 entire success was obtained.

In 1868 he brought out another hundred:—

2 eyes were lost;
in 5 there was partial, and
in 93 entire success.

And in 1869, out of a third hundred—

3 eyes were lost;
6 operations partially succeeded;
91 operations entirely succeeded.

The percentage of total loss being thus shown to be decidedly less than had been found, even by the most expert operators, to be the case with flap extraction.

One of the great objections to this new operation was the loss of vitreous which at first so frequently occurred, and which, as will be seen when we presently describe the method in detail, would seem very likely to take place. After his first labors on this subject had been published, Graefe so much improved his former manner of doing the operation that, in 1867, out of 230 cataracts extracted in this manner, he only had an escape of vitreous 9 times.

He christened his method "modified linear extraction" at this time, but exchanged later the word "modified" for "peripheric." The same year (1867), he concluded an article on the operation in the following words:—"As to the general value of this method of operating, the opinion of competent experts has been almost unanimously expressed. It is no slight thing for a procedure, not only new in itself but requiring careful and unaccustomed study, to hold its own against one already in the field, and in which the leading oculists are either completely versed or have acquired an exceptional skill. The most confident anticipations must be exceeded when, after a short interval, the latter is weighed in the balance with the former and found wanting. The

kindly communications furnished me by my colleagues, the minutes of the ophthalmic congress recently held in Paris, and the voice of public opinion, show this to be really the case, and that hardly one, who has once taken up the linear knife, has been found to return to the constant practice of flap extraction." He here gives the names of men like Arlt, Donders, Bowman and Critchett, who have followed successively so many different methods of operating, and have found this to best stand the test of comparison, and then adds:—"As every new thing in science has been objected to, so it has occurred that a few voices have been raised against modified linear extraction in its present form. It happens fortunately, however, that, in the present instance, the objections are raised by parties who have no personal experience to go upon, and whom we must therefore beg leave to consider as without the pale of this discussion."

We pass at once to a description of the operation. The instruments required are a speculum, fixation forceps, narrow knife, iris forceps, iris scissors, capsule opener (right and left), and caoutchouc spoon. Sponges, soaking in ice-water, should also be at hand.

The patient may either be in bed or sitting up, the eye to be operated on being nearest the window. As the cut is always made upwards, the operator sits or stands behind the patient for the right eye, and in front of him for the left. But, if fortunate enough to be able to make the cut with either hand, he sits or stands in each case behind him.

Ether has to be used in the great majority of cases, as without it most Americans profess themselves unwilling to submit to a surgical operation. If, however, a patient be calm, collected and courageous, it is much better he should endure the comparatively slight pain without an anæsthetic. For, after the preliminary steps have been taken, and we come to the making the cataract emerge from the eye—a thing it is desirable to effect without introducing any instrument—we lose the natural muscular tension which is so valuable an auxiliary, and which gives way, under ether, to complete

relaxation. Again, when cortical masses are left behind after the nucleus has come out, it is desirable to get the patient to look down in order to remove them, and to do this he must have his senses about him. In short, while ether and chloroform are in many cases indispensable, they decidedly embarrass a portion of the operation, and are not to be used in those cases where we have entire confidence in the fortitude and endurance of the patient. Their number is unfortunately limited.

The speculum for separating the lids, now shown (Fig. 1),* differs from those previously in use in being more bent, towards the point of union of its branches, so as to lie more closely against the temple, and thus be more out of the way. It has, moreover, projecting plates, which give the fingers a better purchase in applying and removing it, and is made right and left. Fig. 2 shows the line of its curvature.

The fixation forceps are to be applied below the cornea, and from 1''' to 1½''' towards its nasal side.

The knife (Fig. 3) with which this operation is performed, is peculiar to it. It is, as you see, long and narrow. Originally, a broader one was proposed, but this form has been found to offer, on the whole, the most advantages.



The point of the knife is made to enter the anterior chamber at a point, on the temporal side, corresponding to A, and is not directed in the beginning toward the point of emergence at B, but, in order to make the inner wound all the larger, we push forward toward the point C until the blade has penetrated some 3''' or 4''' into the chamber. The handle is then lowered and the knife advanced under the edge of the sclera to B, where the counter-puncture is made. When

* The speculum shown is intended for the right eye.

the point has once passed through the sclera, the edge of the knife, which has up to this time been carried in a plane parallel to the iris, must be inclined obliquely forwards, and the cut completed by pushing forward the blade as far as it will go, and then withdrawing it, cutting all the while. Once freed from the sclera, the knife encounters the conjunctiva, which it carries before it, and which must be divided so as to leave a flap, never more than $1\frac{1}{2}'''$ in length, and by preference even less, which may serve as a covering.

The point A is to be $\frac{1}{3}'''$ from the edge of the cornea, and $\frac{2}{3}'''$ under an ideal tangent to the cornea at its apex. The point B precisely corresponds. After the counter-puncture the aqueous humor escapes under the conjunctiva, raising it up like a blister. No attention is to be paid to this, but the cut is quietly completed according to the directions already given.

If they be closely followed, a wound is obtained from $4\frac{1}{2}'''$ to $4\frac{3}{4}'''$ in length. For very hard and thick cataracts it should measure $5'''$. Let us pause for a moment, in our description of the operation, to consider its geographical position. It was at first thought that it lay in the sclera, and the greater ease with which this tissue was supposed to heal, as compared with the corneal, was pointed out as one of the chief advantages of the new method. On the other hand, the situation of the cicatrix in the sclera was objected to, as likely to cause separation of the retina through its subsequent contraction. Both advantage and objection are based on erroneous premises. Dissection shows that, while the external wound is in the scleral substance, the main body of the cut (wound canal) is three quarters in the corneal tissue, and the inner edge is entirely corneal. The cut is therefore to be regarded as, in the main, a corneal one; and its advantage over the cut made in flap extraction is that, besides being linear, it is made in the *periphery* of the cornea and not in the corneal substance.

After the knife has been laid aside, any clots of blood that may have formed are to be removed with fine forceps from

between the lips of the wound. We are then ready to take the second step, to proceed to the excision of the iris, which should be always undertaken by the operator himself.

For this purpose he entrusts the fixation forceps to an assistant, and with the iris forceps gently raises the conjunctival flap, lays it back over and smooths it down upon the corneal surface. The prolapsed iris is now generally exposed, and it is of the greatest importance that no portion should be left behind to heal in the wound, especially at its corners, interfere with its union, excite suppuration, and act as a source of permanent irritation. It is to be seized not in its middle, but about 1''' from the temporal corner of the wound, and excised with three or four successive clips of the scissors, care being taken to alter, with each cut, the direction of the blades, making them, as it were, every time tangential to the wound at that particular place. The ordinary curved scissors cannot here be used to advantage, and it is more desirable to employ those that are either straight or bent like a knee at the pivot, the latter being used for the left eye when the operator sits in front. By gently drawing the iris, after each clip, towards the nasal side with the forceps, a sufficient tension is all the time kept up without its being necessary to let it go and seize it afresh. So complete must be the unity of action between the hand that grasps the forceps and that which holds the scissors, that the absolute necessity of having them both belong to the same person becomes clearly manifest.

The fixation forceps are now to be again taken by the operator.

You are aware that the iris is made up of two sets of fibres, sphincter and radiating, the former contracting and the other dilating the pupil. As has been stated, it is of extreme importance to prevent any portion from healing in the wound made for the exit of the cataract, and it is at this stage of the operation that efforts in this direction are most availing. Sometimes the edges of the cut seem perfectly free; if, however, a portion of the sphincter is found to protrude at either

extremity, or even to lie in close apposition, it will get so jammed in during the passage out of the lens as to render its reposition a matter of extreme difficulty. Now, if ever, is the time to replace it. And this is best effected by taking the hard rubber spoon, attached to the other end of the (Fig. 4) cystitome, wetting it, and rubbing with it the surface of the eye-ball, commencing a little on the scleral side of the corner we are working on, and making passes towards the centre of the cornea. The convex surface of the spoon should, of course, be used. It is thus often possible to smooth out the fold of iris lying in the wound, as also to excite contraction of the sphincter and thus retraction of its corner.

Although it is not always possible to prevent the incarceration of a portion of the iris in the wound, the frequency of its occurrence will, by following these directions, be very much diminished, and the success of the operation proportionately increased.

Bleeding into the anterior chamber may proceed either from the divided conjunctiva or the cut edges of the iris. It interferes seriously with the next step, the opening of the capsule. For, unless the operator clearly sees what he is about, he may dislocate the lens on the one hand, or make an insufficient cut in the capsule on the other. It is therefore desirable to clear the blood out of the way. Gentle pressure on the eye with a sponge will often check its flow, after which slight pressure on the scleral edge of the wound will give it a chance to run out. If, however, it still continues to be poured out, the best way of checking it is to apply to the eye a soft sponge dipped in ice-water, changing it from time to time as it loses its coldness.

When the surface of the cataract once more becomes visible, it is time to incise the anterior capsule. The cystitomes (Fig. 4) used for this operation are, as you see, so bent as to be adapted each to one eye only, and are to be introduced in the manner described in the operation of flap extraction. The capsule is to be freely opened in various directions, and well out to its edge. Slight pressure on the bulb with the fixation

forceps, at this time, puts the capsule well on the stretch, and makes it possible for the tooth of the cystitome to penetrate it more effectually.

Should there be a capsular opacity, the forceps shown in the drawing (Fig. 5) are to be used for its removal. They are to be introduced obliquely, one branch in front of, the other through the capsule behind the opacity, then closed and the included fragment of capsule torn away.

All is now prepared for the removal of the cataract, which is to be made to escape from the eye in the following manner: The speculum, it will be remembered, is still in place, and with one hand the operator controls the position of the eyeball by means of the fixation forceps, which have not been removed. They grasp the conjunctiva below the lower edge of the cornea, and from 1''' to 1½''' inward from it. The hard rubber spoon is now to be taken in the other hand, and its convex face applied directly against the lower edge of the cornea. It is then to be turned on its axis in such a way that the bowl of the spoon is turned half up, and the part of the back nearest its upper edge is brought gently to bear against the lower part of the cornea. The spoon thus held and exerting a steady pressure is made to glide along the lower edge of the cornea, giving an upward impulse the while, over the space of about ½'''. In consequence of this the wound opens and the upper edge of the cataract advances to its margin. Pressure with the spoon is now made toward the centre of the eye, but as the cataract emerges, more and more directly upwards, until, chasing the cataract before it, it slides up over the corneal surface, itself the while almost a tangent to it.

This manœuvre must be seen, to be fully understood and appreciated. I have given the account of it as nearly as possible in Graefe's own words.

When the cataract has once presented itself at the edge of the wound it can be assisted in its passage out, and when more than half has come through the rest can be made to follow by directly laying hold of it with the spoon. It is, however, better to resist the temptation to remove it in this

manner, and to follow it up, step by step, from the lower edge of the cornea till the last particle has emerged. The leaving behind of cortical substance may thus most satisfactorily be avoided.

It is of extreme importance, adds Graefe, to keep pressing perpendicularly against the cornea until the cataract is brought up and into the wound, and then, and not till then, to press upwards. If this direction be disregarded, cortical substance is very apt to become detached and left behind.

When, in spite of these precautions, cortical masses have remained behind, their removal must, if possible, be effected in the same manner. Should they resist this, the fixation forceps and speculum must be removed, and the patient left alone a short time, till the effects of the anæsthetic have in part passed away, and a slight amount of aqueous humor recollected. He must then be directed to look down, and gentle pressure and counter-pressure applied with the tips of the fingers, through the lids, as in the case of flap extraction, until the pupil appears black and clear.

We now come to the very important subject of after-treatment. We fortunately possess a short article of Graefe's on this point, written a few months before his death, and embodying all the results and deductions of his ripened experience. It is in substance as follows. And it may be well here to observe that Graefe's inducement to prepare it was, in large part, the fact that his own cases of cataract thus treated did so much better than those of other leading operators.

The edges of the wound being well in contact, and all coagula removed from their vicinity, the eye is to be gently closed, no atropine being now used. The bandage is to be applied in the manner described in the last lecture, a circular piece of soft linen being first laid upon the eye, little tufts of charpie then evenly distributed so as to fill the orbital cavity, and the flannel roller finally passed thrice around the head and thrice over the eye, each ascending fold overlapping its predecessor and being carefully adapted to the equable

support of the entire surface of the bulb. The charpie must be selected and of uniform fineness. It must be so applied that the hand, passed over its surface, fails entirely to appreciate the prominence of the bulb, and that slight pressure upon it causes no sensation of pain. For the object of the bandage is, as you are well aware, to hold the edges of the wound in exact contact, and to maintain the conjunctival flap in close apposition with the surface of the sclera. If, now, we follow the example of many careless surgeons, and take only a single turn of the roller over the eye, which chances to exert more pressure on the lower half of the bulb and on the middle of the cornea than on the wound, we shall get just the reverse of what we desire to effect—the wound will gape and the conjunctival flap be raised. The other eye is to be closed with isinglass plaster.

Another capital mistake is leaving the bandage undisturbed for several days, when no pain is complained of. It should be removed the evening of the operation, and again on the succeeding morning. After this it may be changed once in twenty-four hours. When the first change is made, traces of blood, tears, conjunctival secretion, possibly remains of cortical substance, will be found on the patch of linen next the eye; and it is readily conceivable that such a mixture, if left undisturbed, might decompose and become a source of infection to the eye itself. Graefe advises, on first removing the bandage, that the upper lid be gently raised and a hasty glance taken at the lower part of the cornea, by the aid of a single candle. He does not yet recommend the exposure of the wound.

Graefe protests against a certain apathy with regard to the after-treatment of cases that do not seem to be doing well, which he has even seen evinced by some of the leaders of the profession. He believes in meeting the earliest indications with an energetic plan of treatment; and advises that particular attention be given to the least indication of pain, in the region of the wound, that does not appear to be a necessary concomitant of its union. Sometimes, no pain follows the

operation. It should never be so severe as to keep the patient restless or prevent his sleeping, nor should it take on a rending, burning, or darting character. If it does, a subcutaneous injection of morphia is to be made on the temple. Should the pain, in spite of this, continue, the bandage is to be removed, and the lids bathed for a few minutes with a soft sponge dipped in cold water.

The pain in the wound should begin to decrease after the third hour. Should it not do so, the same rules are to be observed.

After the sixth hour there should be no continuous sensation in the eye that has been operated on. A slight pang, when the patient attempts to move his eye under the bandage, need not of course be regarded. If, however, there be a continuous sensation, the bandage should be changed; if this prove insufficient, a morphine injection is to be made. There are a good many people who, realizing the importance of an operation for cataract, expect as a natural consequence a certain amount of pain, and nerve themselves for its endurance. This idea should be summarily dispelled, and warning be given that any enduring sensation in the operated eye, whether it involve much or little pain, is an evidence that something is wrong, and its existence is at once to be made known. A second injection of morphine may be made if necessary, or, if the patient is full-blooded and his circulation excited, four to five ounces of blood may be taken from the arm.

Too much stress cannot be laid on the importance of a good night's sleep following the operation. It is well to give the patient a dose of castor oil the day before, the effect of subsequent narcotics being thereby rendered more uniform as well as sure. The evening of the operation chloral may be administered, care being taken that a German preparation, by preference Liebreich's, be used. The best vehicle for its administration is the syrup of allspice, *syrupus pimentæ*. Graefe was in the habit of giving from seventy-two to ninety-six grains at a dose in ordinary cases; while with people of intemperate habits he found at least two drachms necessary.

Should the first dose prove ineffectual, he would give to the former class twenty-four, to the latter forty-eight grains more, four hours later. If injections of morphine had already been made to relieve local pain (from one-sixth to one-fifth of a grain in amount), with good effect except as far as inducing sleep was concerned, he would give ordinary patients forty-eight grains, drinkers from seventy-two to ninety-six grains of chloral in addition.

As a general rule, the reaction in the wound takes place between the twelfth and the twenty-fourth hour succeeding the operation, in the majority of cases between the fourteenth and eighteenth. If all is going on well, not the least pain should be experienced. But if, towards the end of the first night, or towards morning, any decided sensations are felt, they are to be carefully noted, inasmuch as this is the most critical moment. Though the hour for changing the bandage has not arrived, it should at once be removed, and the condition of the eye investigated. The wound itself need not be examined unless there is an increased secretion of tears, swelling of the lids, chemosis, or diminished lustre of the cornea. It will be sufficient to gently wash the lids, renew the bandage, and, in extreme cases, to inject a little morphine. If, after this, the pain persists, at least four ounces of blood are to be taken from the arm. If the lower layers of charpie are wet, if the upper lid is swollen, and if the fold of linen in immediate contact with the eye is covered with much secretion, suppuration of the wound is imminent, and active measures must be resorted to. The lids are to be carefully washed, and their cutaneous surface then brushed over with *lapis mitigatus* (a crayon of one part nitrate of silver and two parts saltpetre), washed immediately afterwards, first with salt and water, then with cold water, and thoroughly dried. The bandage is to be replaced in the *constrictive* form, which has already been referred to, four turns being taken over the eye, the second and third being drawn particularly tight. If the patient is tolerably plethoric, six ounces of blood are to be taken from the arm, and half an hour later

an injection of morphine is to be made on the temple. Soon after the bleeding, a cathartic powder of calomel and rhubarb is to be administered; if in ten hours no dejection occurs, a dose of castor-oil should be given. When the patient is not particularly strong the venesection may be omitted, and only a small dose of calomel given.

Such energetic measures as the foregoing have been severely criticized, and will in all probability be for some time condemned by a portion of the profession, who see in them a return to the errors of a past generation. Innovations on the established order of things are always sure of meeting with a resistance which thinks more of being energetic than reasonable, the adherents of which are largely drawn from the class of routine practitioners. Ask any one you hear objecting to and criticizing this treatment, whether he has ever tried it himself. And hear the words of a clear-headed, conscientious and sincere observer. "When these measures are taken in season, we often see, at the next change of the bandage (which, under such circumstances, should not be delayed more than six hours), an entire retrogression of the unfavorable symptoms, and the case resuming its normal course."

Suppuration of the wound is ordinarily ushered in by pain, but with some patients no such warning is given. This illustrates the importance of renewing the bandage at the time of the period of reaction, even if all seems to be going on right, as we may otherwise find that the favorable period for treatment has passed away. In such cases, Graefe lays special stress on the thorough cauterization of the cutaneous surface of the lids, on the constrictive bandage and the cathartic powders. The morphine injection is to be omitted, if pain is wanting, while venesection is only to be resorted to when the patient is strong and has a full pulse. Bloodletting is, indeed, only to be advised during the short initial period, it being of no value when the suppurative process is fairly under way. As regards leeches, in cases of threatening suppuration, their application to the temple does positive harm. If placed behind the ear they are less dangerous, but annoy the patient

considerably. The most potent remedies during this period of reaction are the cauterizations and the constrictive bandage, which are to be renewed every six hours. In the case of patients whose health is much reduced, quinine should be given in addition, its administration being preceded by a cathartic.

Anomalous symptoms during the subsequent treatment are apt to be dependent on partial suppuration of the wound, with its usual accompaniments. If gastric irritation be present, an emetic should be given on the second day, and the compressive bandage and cauterizations of the lid continued. Warm fomentations are to be used between the applications of the bandage, but are not to be left on for more than from quarter to half an hour at a time, and are entirely to be desisted from if their employment be attended by swelling. Graefe mentions that he was formerly in the habit of using these warm aromatic fomentations more freely, and still considered them of the utmost value in cases of transplanted iritis and the like.

The food administered should vary in accordance with the strength and habits of the patient. His bill of fare should, on no pretext, include articles that are entirely novel or absolutely repugnant to him.

The after-treatment should be largely based on the habits and circumstances of the individual, the principles that have been enunciated being those that are generally applicable. Neglect in following them lies at the door of many a failure.

I have given you an almost literal summary of Graefe's views as regards the treatment after the operation for cataract, and will conclude in his exact words. "I have simply insisted on the principles," he says, "which in general seem to me to best ensure the success of the operation, and a neglect in following which may be made to explain many a disastrous case. Anxious vigilance need only be exerted for a few days. The fact that a human being's whole happiness depends on the result serves to whet our energies. And, after all, how infinitely shorter is the period of anxiety and care, than was the case with the old method! If twenty-four hours have

passed away without any premonitory symptoms of suppuration of the wound having shown themselves, and if constant care be exercised, there is nothing more to fear. After three or four more days have elapsed without any untoward occurrence, we have merely to exert ordinary care and instil atropine, the application of which is not to be advised before the third day, unless cortical masses have been allowed to remain. If the conjunctiva stands it, and the patient has not an eye constantly kept on him, I keep the bandage on up to the end of the first week, for fear of injury. And the process of leaving it off must, instead of a sudden, be a very gradual one, the application being at first discontinued for only a few hours at a time. Even in the winter season, the most of my patients are discharged before the end of the second week."

This concludes, gentlemen, the description of the modern operation for cataract. We have traced the various ways devised for the removal of this disease, have examined into the principle on which they are based, and have witnessed the manner of their performance. Finally, we have applied to each the touchstone of relative success, and have seen why one has followed the other, and why method has succeeded method, in the earnest attempt to eliminate the various causes of failure. The end is not yet, but it is to be hoped that all will agree that, up to the present time, no operation has taken the field that gives a patient, blind with cataract, the same chance of recovering his sight as the one we have to-day studied.

AN ANALYSIS OF SIXTY-ONE CASES OF EX- TRACTION OF CATARACT BY THE METHOD OF GRAEFE.

IN connection with the lecture on the modern operation for the extraction of cataract, I desire to present an analysis of sixty-one cases in which I have performed it. One-third of these occurred in private, and two-thirds in Infirmary practice.

It should be stated in the outset that this list includes the earliest operations I performed, my knowledge of the method, as well as of the after-treatment, being purely theoretical. Nothing had then been printed on the subject. I had had the good fortune to be present at Heidelberg when Prof. von Graefe explained the operation, and my notes of his remarks were my only source of information. Most of the cases of loss of vitreous, and two out of the three failures, occurred at this period or shortly afterwards. I have since, in common with other ophthalmic surgeons, experienced a large diminution of accidents, as well as an increased percentage of success, through the manual dexterity acquired by practice and a close adherence to Graefe's later instructions.

Out of fifteen operations, performed between the first of March and the fifteenth of April, of the present year, there was but one case where the result was other than successful. This was that of a man, eighty-five years old, one of whose eyes had been already operated on, by a colleague, without result, the vitreous having been found in an unnaturally fluid condition, and escaping in large quantity. The pupil of the second eye, where a similar state of things existed, is now

completely closed, but there is good perception of light, and a subsequent iridectomy promises well.

The age of my oldest patient was eighty-five, that of the youngest fifteen; the average age being sixty.

The operations were all performed under ether. The position taken was behind the patient for either eye. The method was in the main that described in the lecture, with occasional modifications to suit individual cases. It was found on the whole that those cases did best in which Graefe's directions were most implicitly followed. Pressure on the bulb from the old-fashioned speculum was sometimes found dangerous, and my original practice was to remove it and substitute an elevator under the upper lid, as soon as the cut was completed. But the new speculum, figured in the drawing, may be left in place from the beginning to the end of the operation.

In fifty-one of these cases no accident occurred during either the operation or the after-treatment. In four, there was a considerable, and in three, a slight escape of vitreous. In seven, the scoop had to be used to bring out the lens. Four of the eyes in which vitreous was lost were seriously diseased, and the accident is in no wise attributable to the manner in which the operation was performed.

For nearly a year past it has been my practice to remove the bandage and examine all eyes within twelve hours of the operation, and I rarely failed to find the anterior chamber largely re-established at the end of that time. In a single case, the wound remained open eight days, without apparent cause, and then healed, the patient recovering vision of $\frac{1}{16}$. The average duration of the after-treatment was 17.4 days.

The following case deserves special notice. Capt. B., aged 70, a hale, vigorous man, consulted me May 2d, 1870. His right eye presented a well-formed cataract, which had been coming on about three years. The cornea was large, the pupil responded freely to atropine and the perception of light was very good. I accordingly gave a favorable prognosis, sent the patient to the Carney Hospital, and operated May 4th, under ether. As soon as the capsule was opened an escape of vitreous took place, and I was obliged to remove

the lens by a scoop, and then to close the eye, leaving considerable cortical substance behind. There was, however, no pain or irritation the following days, the cornea continued clear and the field of the pupil began to clear up. Some restlessness at night yielded to moderate doses of chloral. On the night of the 10th, he appeared more nervous than usual, and I ordered him chloral gr. xlv. He soon fell asleep and began to dream that he had been shut up by some boys in a room on the ground floor of a barn in his native town. Filled with this idea, and anxious to extricate himself from the situation, he arose, threw up his window, leaped to the ground, a distance of about twelve feet, scaled the hospital fence, and was found a short time afterwards walking down the hill, in his night-shirt and through a pouring rain, and just beginning to come to himself. He was brought back to the hospital, and I was immediately sent for. I arrived at 1, A.M., and found the patient (who weighed about 175 lbs.) lying in bed, with his face a good deal scratched, and the lids of the operated eye much swollen and firmly closed. On separating them, a stream of blood started out and trickled down his face. The anterior chamber was full of blood, perception of light quantitative, and there was some chemosis.

Strange to say, the patient neither took cold nor sustained any bodily injury. The blood slowly absorbed, a slight attack of iritis came on, but was readily subdued, and he left the hospital June 5th, with vision $\frac{1}{15}$.

Iritis occurred five times. In seven cases the pupil was occluded by capsule or false membrane, and Agnew's operation had to be subsequently performed.

There were three cases of failure. One was owing to diffuse suppuration of the cornea, occurring in a very feeble old woman of 77. Another depended on intra-ocular hæmorrhage, coming on suddenly and without apparent cause a few hours after the operation. The third occurred with a man of 62, whose cornea was very small, pupil hardly dilatable, and vitreous fluid. Portions of the lens were unavoidably left behind, owing to the escape of vitreous, and the eye was lost by panophthalmitis. I subsequently operated successfully on the second eye, and he was able to read with comfort, when last heard from.

The results of visual acuteness are given in the following table. Some of the examinations were made a very short time after the operation, and it is reasonable to suppose that improvement has since taken place. Five cases are marked "unrecorded." They were, with a single exception, normal operations, and the result of each was successful. But they left town before the vision could be accurately recorded, and have not as yet redeemed their promise of returning to have it done.

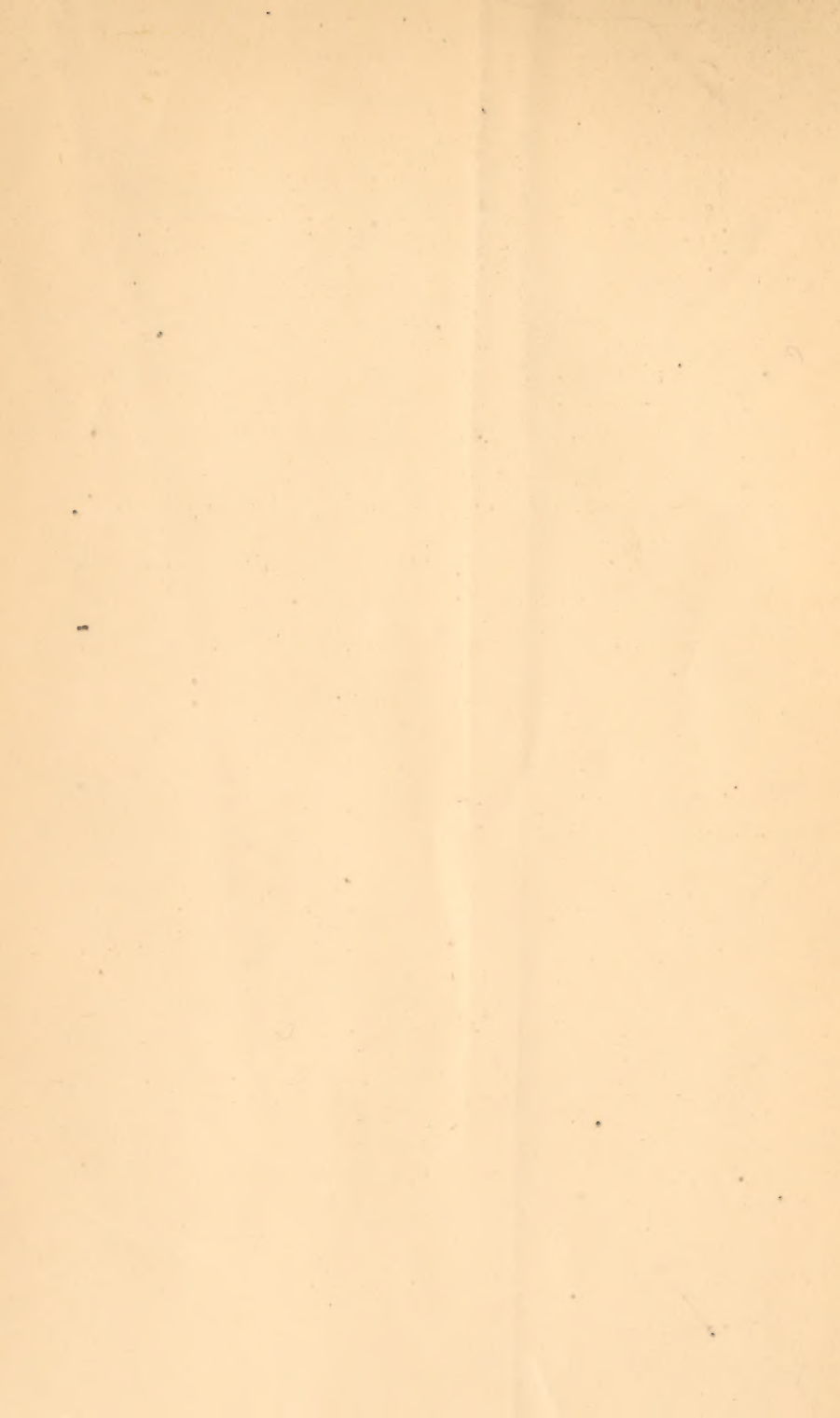
The three marked "undetermined" are still under treatment. Two will undoubtedly prove successful, and the chances of the third are improving daily.

No. of Cases.	Vision.
2	$\frac{2}{3}$
1	$\frac{1}{2}$
8	$\frac{2}{5}$
1	$\frac{1}{3}$
2	$\frac{2}{7}$
5	$\frac{1}{4}$
9	$\frac{1}{5}$
1	$\frac{1}{6}$
4	$\frac{1}{7}$
3	$\frac{1}{8}$
8	$\frac{1}{10}$
1	$\frac{1}{11}$
2	$\frac{1}{14}$
1	$\frac{1}{25}$
2	$\frac{1}{30}$
5	unrecorded.
3	undetermined.
3	failures.

Or, in general terms, and proceeding on the estimate of Graefe, we have, in sixty-one cases—

Failure	3
Partial success (vision $\frac{1}{11}$ to $\frac{1}{30}$)	6
Entire success (vision $\frac{2}{3}$ to $\frac{1}{10}$)	44

With eight additional unrecorded cases, all but one of which bid fair to come under the last head.



ERRATA.

PAGES 15 AND 16.

These doses of chloral were reduced to grains by the aid of an erroneous table.

The last three lines of page 15 should read :

"Graefe was in the habit of giving from forty-five to sixty grains at a dose in ordinary cases; while with people of intemperate habits he found at least seventy-five grains necessary."

Page 16. The upper paragraph should read, at its commencement :

"Should the first dose prove ineffectual he would give to the former class fifteen, to the latter thirty grains more"—

its concluding lines :

"he would give ordinary patients thirty grains, drinkers from forty-five to sixty grains of chloral in addition."

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